and physical conceptions of the structure of complex molecules. They seem to demand essentially a condition of kinetic equilibrium between molecules and atoms; inter-atomic distances we shall have to consider greater than was our wont; atomic and molecular influences must extend to considerable distances. Geometrical static arrangement of atoms or groups of atoms seems incompatible with their behavior. The relation of atoms in the molecule seems rather to be orbital, permitting of ready rearrangement and readjustment by relatively slight disturbing causes, capable of returning to former relations promptly, involving various quantities of energy. All our inferences in reference to molecular magnitudes will have to be interpreted as effective merely, and not actual in the sense of space occupied.

The one central pillar upon and about which all physical science is erected to-day, the conservation of energy, stands unchanged and, if possible, more clearly defined and strengthened than ever in these tests.

I repeat, may American physicists take up these problems and add their share to the development of these epoch-making theories.

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*THE CORNELL EXPEDITION TO GREENLAND.*

The Cornell party, which accompanied Lieut. Peary on the steamer Hope, left Sydney, July 16th, and passed the entire eastern coast of Labrador near the land, with one stop at the island of Turnavik. Entering Hudson Strait a stop of several days was made at Big Island and the neighboring coast of Baffin Land. From here an unsuccessful attempt was made to penetrate the ice which stretched across the mouth of the Cumberland Sound, after which the ship steamed across to Disco Island, on the Greenland coast. A stop was made there, another in the Vaigat Strait and a third at Umanak. After a brief stop at Upernavik, the party was landed, August 7th, on the Nugsuak peninsula, Latitude 74 °7′, about 80 miles north of Upernavik. The party remained there until September 7th, and then returned, following practically the same route and making nearly the same stops as those made on the northern passage on the Greenland coast. On the American side a stop of two or three days was made in Cumberland Sound, where the conditions closely resemble those in Hudson Strait.

The main object of the expedition was to study the geology of a small area in some detail; but collections of plants, insects, marine invertebrates and birds were also made. In connection with this work considerable dredging was done.

Briefly stated, the principal geological results are as follows: At Turnavik, on the Labrador coast, evidence of recent glaciation is abundant. The hills are all rounded; there has been little post-glacial decay, and the transported boulders, as well as the bed rock, are very fresh. Upon exposed rock faces, unprotected from the weather, glacial striæ are still very distinct. Granting equality of weathering, this region has been much more recently glaciated than regions of similar geological structure in New England. The amount of glacial carving has not been sufficient to lower the surface of the gneiss to the level of the pre-glacial decay in the trap-dike valleys.

Until the northern end of the Labrador peninsula is approached evidence of glaciation in the form of rounded contours is so distinct that it may be seen from a ship several miles from land. At Cape Mugford, Table Mountain and vicinity, in Latitude 58° 59′, the topography changes to the angular type, and this highland portion of the

narrow northern prolongation of Labrador may have risen above the ice. Later experience in Greenland, however, has led me to place little coufidence in evidence of this sort. Rounded contours are positive evidence of value, but the negative evidence of angular outline is of little value, particularly when combined with considerable elevation. The rate of weathering and erosion on some classes of rock in high latitudes is extraordinary ; and if, as is so often the case in Greenland, the glaciation did not suffice to greatly modify the pre-glacial topography, the combination of pre-glacial and post-glacial denudation serves to abundantly mask the evidence of glaciation when the hills are viewed from a distance.

That part of Baffin Land bordering Hudson Strait in longitude 70°–71° has all been glaciated up to an elevation of at least 600 feet. The evidence of this is found in indistinct striæ, an abundance of transported fragments of limestone, and other foreign rocks, and the roches moutonneés form of the rock outcrops. The garnetiferous gneiss and crystalline limestone of the region have been markedly disintegrated since the retreat of the ice sheet; and yet the recency of this retreat is shown by the freshness of some of the rocks and also by the fact that some of the lakes have two outlets, while one was seen with five outlets.

Both at Big Island and on the main Baffin Land evidence of very recent elevation is found to a height of 270 feet above the sea. The evidence of this is present in the form of a series of perfect boulder beaches, one above the other, marking various halts. In a muddy gravel, at an elevation of 270 feet, an abundance of Saxicava, Mya and other shells was found. A depression to this amount would lower a very considerable area of the border of this part of Baffin Land.

The results of the study on the Nugsuak peninsula will be more fully described elsewhere. At the southeastern base of the peninsula there is a large glacier which is given the name Cornell glacier and on the northern side is the Wyckoff glacier.* The latter is nearly stagnant and enters a narrow fjord from which the winter floe ice did not escape during the summer. The Cornell glacier is active, but not nearly so much so as some of the glaciers south of it. This is shown not by actual measurements of the rate of motion, but by the quantity of the bergs which are discharged. For various reasons, mainly because of the roughness of the ice surface and the lateness of the season, no determination of the rate of movement of the Cornell glacier was attempted. On the Nugsuak peninsula there are several glaciers ranging from mere snow fields to a glacier of the valley type which just reaches the sea.

The Nugsuak peninsula extends 24 miles from the front of the Cornell glacier to the end at Wilcox Head. To seaward at a distance of 8–10 miles from Wilcox Head lie the Duck Islands, one of which rises to an elevation of 110 feet above the sea, while the other attains an elevation of 200 or 300 feet. The depth of the neighboring sea is in some places over 100 fathoms.† The highest point on the Nugsuak peninsula is 2,500 feet and in many places its elevation is over 1,000 feet. At Wilcox Head the elevation is 1,400 feet and the sea near by more than 100 fathoms in depth. The rocks are all gneiss crossed by numerous trap dikes, the gneiss being apparently a metamorphosed sedimentary series faulted and folded with great complexity.

A retreat and advance of the Cornell glacier at some recent time is proved by the presence of fragments and entire shells of

*Named after Mr. E. G. Wyckoff, who generously furnished the money needed for the expedition.

† Based upon a sounding made about half way between Wilcox Head and the Duck Islands, which gave 114 fathoms, and upon the fact that bergs from 75 to 100 feet above the water pass through the channel.

Saxicava, etc., in the moraine now being constructed as well as in the ice itself. These occur at all elevations from sea level to 600 feet, but the configuration of the region is such that this may not mean a retreat of more than one or two miles.

Notwithstanding this retreat and advance, the glacier is now engaged in a rapid withdrawal. The evidence of this is found in moraines 100 or 200 feet from the ice front, in some of which an ice core still exists, while in all cases the withdrawal has been so recent that the boulders have not become lichen-covered. The same is true of the bed rock between the moraines and the ice.

This very recent retreat is a part of a general withdrawal of a vast ice sheet, which extended outward beyond the Duck Islands, a distance of no less than 32 miles from the front of the Cornell glacier. The entire Nugsuak peninsula has been so recently glaciated that striated rocks are still present even at the outer end. Boulders of slate, quartzite and porphyritic granite-rocks, nowhere found in place on the Nugsuak, occur abundantly in the moraine of the glacier and are strewn over the peninsula. The granite was also found on the Duck Islands in a bed of till. At the Devil's Thumb, which rises 2,600 feet above the sea, transported blocks of the granite were found, and they are abundant at the top of the highland of Wilcox Head, 1,400 feet above the sea. Therefore, granting a depth of no more than 100 fathoms for the fjord south of the Nugsuak, there has recently been an ice sheet here covering all of the land and having a depth of no less than 2,000 feet, and probably much more. At the Duck Islands, 8–10 miles farther from the mainland, and 32–34 miles from the present ice front, the ice sheet had a depth of no less than 800 feet, and probably much more.

So, in this part of Greenland at least, the present glaciation is a shrunken remnant of a former greater sheet, the western limits of which cannot be drawn. At Disco Island, at an elevation of 2,000 feet, gneiss boulders rest on trap; and, while they *may* have been brought from within the island, it is equally possible that they were brought from the direction of the mainland. It will be an interesting point to decide how extensive this greater glaciation has been. It seems hardly probable that it was local.

Various detailed observations were made along the margin of the glacier and upon the direction of movement in the ice as well as of the ice over the peninsula. One of the most marked features noticed is the remarkable control which topography has upon ice movement, especially in the last stages of the ice. In one case the movement of an ice tongue of the main ice cap is moving in exactly the opposite direction from the general movement of the ice which supplies it. The general movement is one thing, the deviation from this induced by larger topographic features is quite another, and the influence of minor topographic features in the very last stages is still another; but while one gains much in the way of valuable hints from a study of the Greenland ice sheet, he must needs be very cautious in his application of these to our own recent glaciation. The conditions are very different, and in no way is this more markedly shown them in the decided poverty of drift in the control of the Greenland ice.

The thanks of all connected with the expedition are due to Lieut. Peary for the sagacity with which his plans were laid and executed. The terrors of Arctic navigation, of which we have all learned so much, do not appear in his summer trips; and, judging by this summer and the several preceding ones, an expedition to Greenland under the lead of Lieut. Peary is as safe and pleasant a summer excursion as one to Alaska. The expedition went and returned on schedule time, and this has been

his previous experience. It is one constant panorama of wonderful scenes, with land nearly always in sight, often on both sides, and with the water ordinarily as calm as the surface of a small inland lake. The fact that all who go wish to go again in the best evidence that can be offered of the great attractions offered by Greenland to the geologist and naturalist. I feel that this statement is warranted because it is so greatly at variance with the common conception of Greenland and the southern Arctic.

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*ALBERT NELSON PRENTISS.*

PROF. ALBERT NELSON PRENTISS, who for twenty-eight years has occupied the chair of botany in Cornell University, died at his home on the University Campus, Friday, August 15, 1896. He had been in failing health for several years, and the readers of SCIENCE will recollect that last February severe illness induced him to ask to be retired from active labor in the department, and the Board of Trustees elected him professor emeritus.

Prof. Prentiss was born May 22, 1836, at Cazenovia, Madison County, N. Y. He was a member of the first graduating class of the Michigan Agricultural College, at Lansing, in 1861, and the entire class of seven young men immediately enlisted in the army at the outbreak of the Civil War. He was enlisted in the Signal Service Corps at Battle Creek, Mich., and assigned to special signal service duty in the interior of Missouri. His connection with the army was of short duration, owing to a reorganization on the retirement of the commanding general. In 1862–63 he was associate principal of the Kalamazoo, Mich., high school, and in 1863–64 was instructor in botany and horticulture at his *alma mater* the Michigan Agricultural College, receiving the degree of M. S. in 1864. He was promoted to the professorship of botany and horticulture in 1865, and held this place until called to the professorship of botany, arboriculture and horticulture in Cornell University, at the opening of the University, in the autumn of 1868. He entered upon his work in this new field with enthusiasm and planted the first autumn seeds of a number of species of trees for a nursery to provide trees for beautifying the grounds. Many of these trees were transplanted in various parts of the campus, but the rapid growth of the University has called for their displacement to provide room for buildings, so that now but three pine trees remain of this original nursery, which are of the same age as the University.

Prof. Prentiss' work has been given largely to teaching and to the supervision of the large grounds of the University, and there are not many published papers of his. In 1871 he wrote an essay on the 'mode of the natural distribution of plants over the surface of the earth,' which won the first Walker prize offered by the Boston Society of Natural History, and was published in pamphlet form. Later, at the request of Prof. B. E. Fernow, Chief of the Division of Forestry, U. S. Department of Agriculture, he prepared an extended monograph of the hemlock (*Tsuga canadensis*), that has not yet been published.

In 1872 he studied for six months in the Royal Botanic Garden at Kew, London, and in the Jardin des Plantes, Paris.

Prof. Prentiss was one of the members of the 'Cornell Exploring Expedition,' as it usually is called, which was organized by Prof. C. F. Hartt, the then professor of geology in Cornell. This expedition was made possible largely by the generous gift of funds by the Hon. Edwin Barber Morgan, of Aurora, N. Y., and is known in University history as the 'Morgan Expedition.' The party sailed from New York